Adapted from: Smith, Margaret Schwan, Victoria Bill, and Elizabeth K. Hughes. “Thinking Through a Lesson Protocol: Successfully Implementing High-Level Tasks.”

*Mathematics Teaching in the Middle School 14* (October 2008): 132-138.

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| **PART 1: SELECTING AND SETTING UP A MATHEMATICAL TASK (PREPARE)** | |
| What are your **mathematical goals** for the lesson? (i.e., what do you want  students to know and understand about mathematics as a result of this lesson?) | Make a line plot to display a data set of measurements in fractions of a unit ( ½, ¼, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. From a line plot, find and interpret the difference in length between the longest and shortest specimens in a collection.  I also want students to understand that even though the denominator is larger is the fraction is actually smaller. Then see that relationship in adding and subtracting fractions |
| * What are your **expectations** for students as they work on and complete this task? * What **resources or tools** will students have to use in their work that will give them entry into, and help them reason through, the task? * How will the students work—   independently, in small groups, or in pairs—to explore this task?   * How will students record and report their work? | Students will understand the construction and interpretation of a line plot (number line)  Students will understand how to interpret data to answer a word problem.  Students can construct a line plot using fractions as a reference.  Students can decompose a line plot to solve simple fraction problems using addition or subtraction.  Students can create a line plot for a given data set that utilizes fractions.  Students can use models, illustrations, algorithms, and/or writing to construct and decompose a line plot to calculate the answer.  Tools  Containers for catching bugs on the playground, Pencils, Paper, Ruler to measure bugs.  This ties into the Science Core of classification of insects, but must be done during spring or fall, when insects are present. Students will work in small groups to capture, record, and compare data. |
| How will you introduce students to the activity so as to provide access to *all*  students while maintaining the cognitive demands of the task? | **LAUNCH**  Take students to the playground to find one small insect, for example: ant, roly poly, earwig, moth, ladybug, and etc. Each student must bring one inside for measurement and comparison. |

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| **PART 2: SUPPORTING STUDENTS’ EXPLORATION OF THE TASK (EXPLORE)** | |
| As students work independently or in small groups, what **questions** will you ask to—   help a group get started or make progress on the task?   focus students’ thinking on the  key mathematical ideas in the task?   assess students’ understanding of  key mathematical ideas, problem- solving strategies, or the representations?   advance students’ understanding  of the mathematical ideas? | First, introduce a “unit” measurement as any fraction with one as the numerator.  Why do we need fractions?  How can we make these different fractions work together?  When the denominator is a larger number, why is that a smaller measurement? |
| How will you ensure that students remain **engaged** in the task?   What assistance will you give or what questions will you ask a  student (or group) who becomes  quickly frustrated and requests more direction and guidance is  solving the task?   What will you do if a student (or group) finishes the task almost  immediately? How will you  extend the task so as to provide additional challenge? | Some kids may be squimish. Early finishers could assist these kids with their research.  2 groups who finish early could now combine both data sets to make a new data set with 8. They could see how this changes the results of their research. |

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| **PART 3: SHARING AND DISCUSSING THE TASK (DISCUSS/DEBRIEF)** | |
| How will you **orchestrate the class discussion** so that you accomplish your mathematical goals?   Which solution paths do you want to have shared during the  class discussion? In what order will the solutions be presented? Why?   What specific questions will you ask so that students will—  1. make sense of the  mathematical ideas that you want them to learn?  2. expand on, debate, and question the solutions being shared?  3. make connections among the different strategies that are presented?  4. look for patterns?  5. begin to form generalizations?  ***What will you see or hear that lets you know that all students in the class***  ***understand the mathematical ideas that***  ***you intended for them to learn?*** | What are the real world applications of this activity?  How is collection and comparison of data useful?  How do we make the fractions get along?  What is a data set? |

In groups of the 4 the students will measure and compare their insect. They will then make a line plot using fractions between 0 and 1in. all 4 students S

Take students to the playground to find one small insect, for example: ant, roly poly, earwig, moth, ladybug, and etc. Each student must bring one inside for measurement and comparison

Students will take containers onto the playground to collect 1 specimen each.

Then, they will record their data by putting their measurement on the line plot(number line), from least to greatest.

Now, using subtraction and fractions, students will tell how much bigger each insect is.

Next, the 4 members of the group will add their fractions to tell the total insect length of their group.

Finally, the groups will compare data to see which group found the greatest length of insect.